



Update on the Mars Science Laboratory

Abigail Fraeman

Deputy Project Scientist

Ashwin R. Vasavada

Project Scientist

Jet Propulsion Laboratory, California Institute of Technology

MEPAG VM #13, Sept. 27, 2021



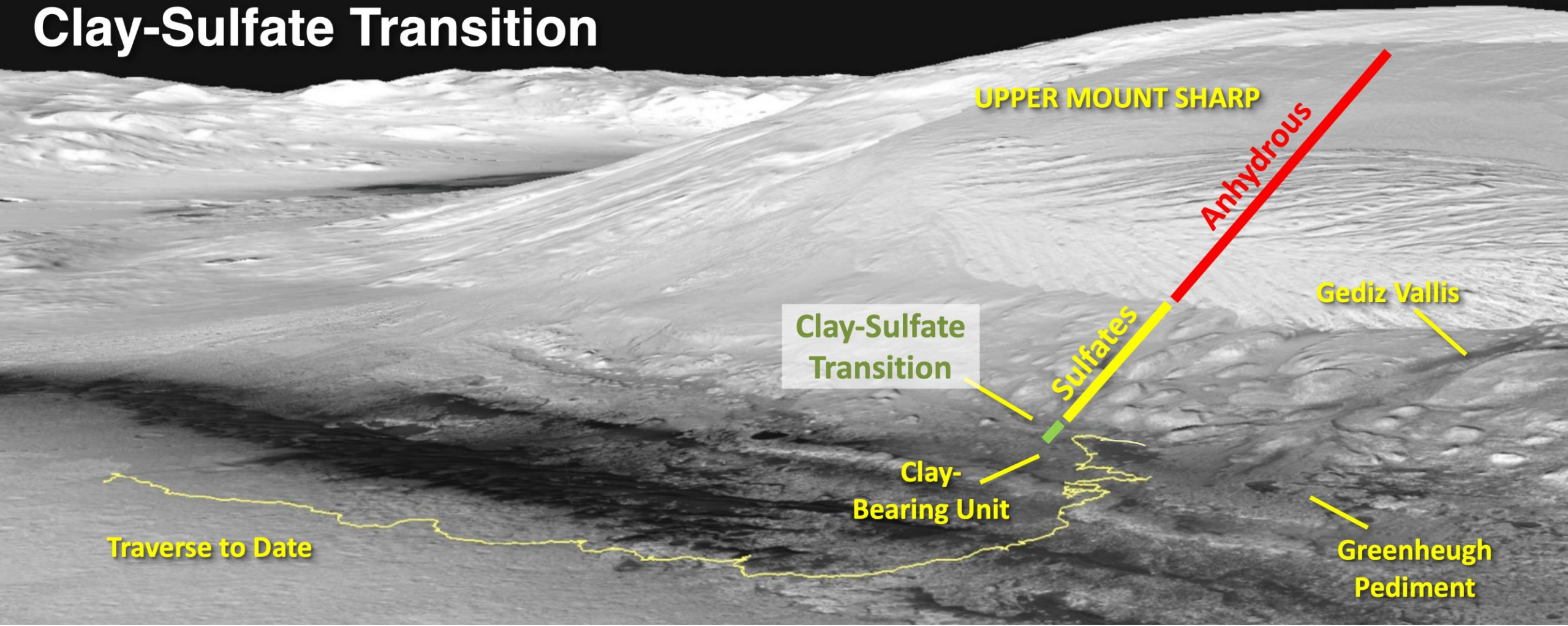
Mission Status as of Sept. 20, 2021 (Sol 3244)

- All ten payload instruments are producing high-quality measurements
- Wheels are estimated to support at least an additional 17 km
- JPL operations team continues to operate remotely, with minor impact
- Total Odometry: 26.6 km
- Elevation gain: 505 m
- Drilled samples: 33



New Project Manager:
Megan Lin (JPL)

Clay-Sulfate Transition



- Curiosity is in a region where orbital data show Mount Sharp strata transition from clay-bearing to sulfate-bearing. This area likely records a major environmental transition and was a key reason that Gale crater was selected for the mission's landing site.
- Curiosity is providing the first chance to explore this globally significant transition in situ. The team will search for evidence about the mechanisms driving this critical period of climate change in Mars' history, and its impact on the evolution of the planet's habitability.

Exploring the Clay-Sulfate Transition



- 1.49 km from Nontron to Maria Gordon
- 58.1 m elevation gain

Partial Sol 3167 360° Mosaic, “Pontours” Drilling location



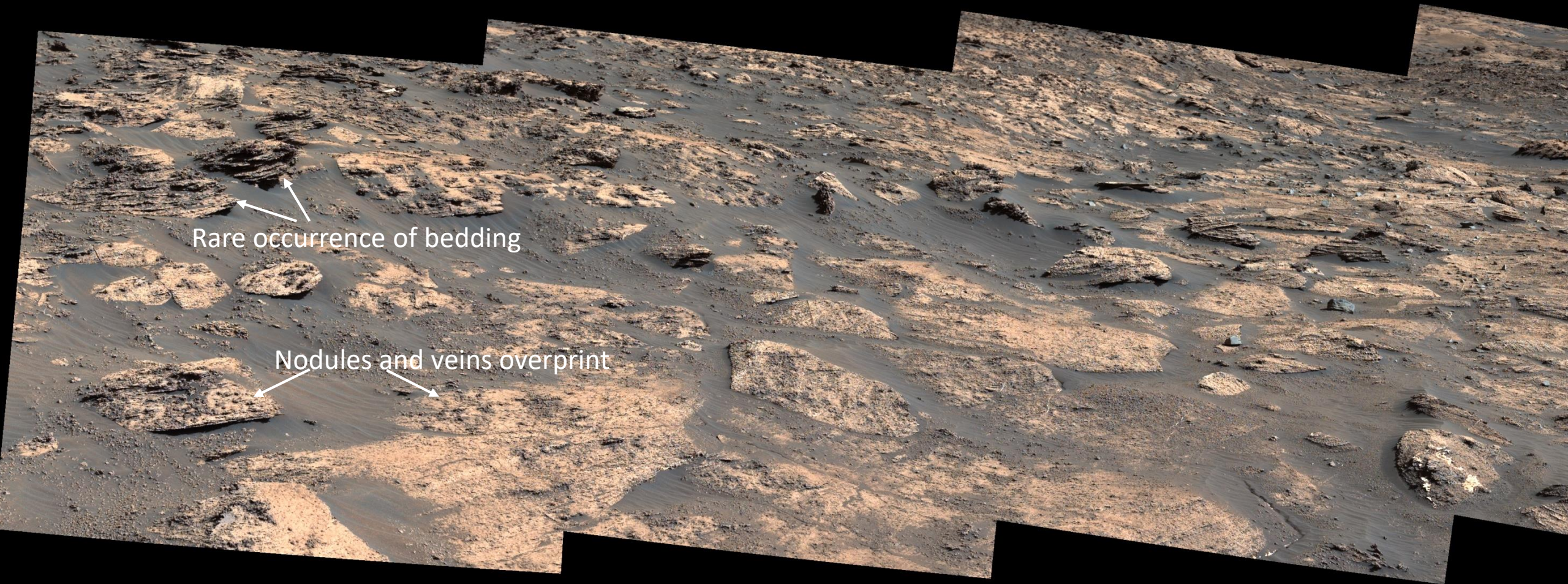
“Pontours” Drill Location

Sol 3174

~ 50 cm



Sol 3202 Drive Direction



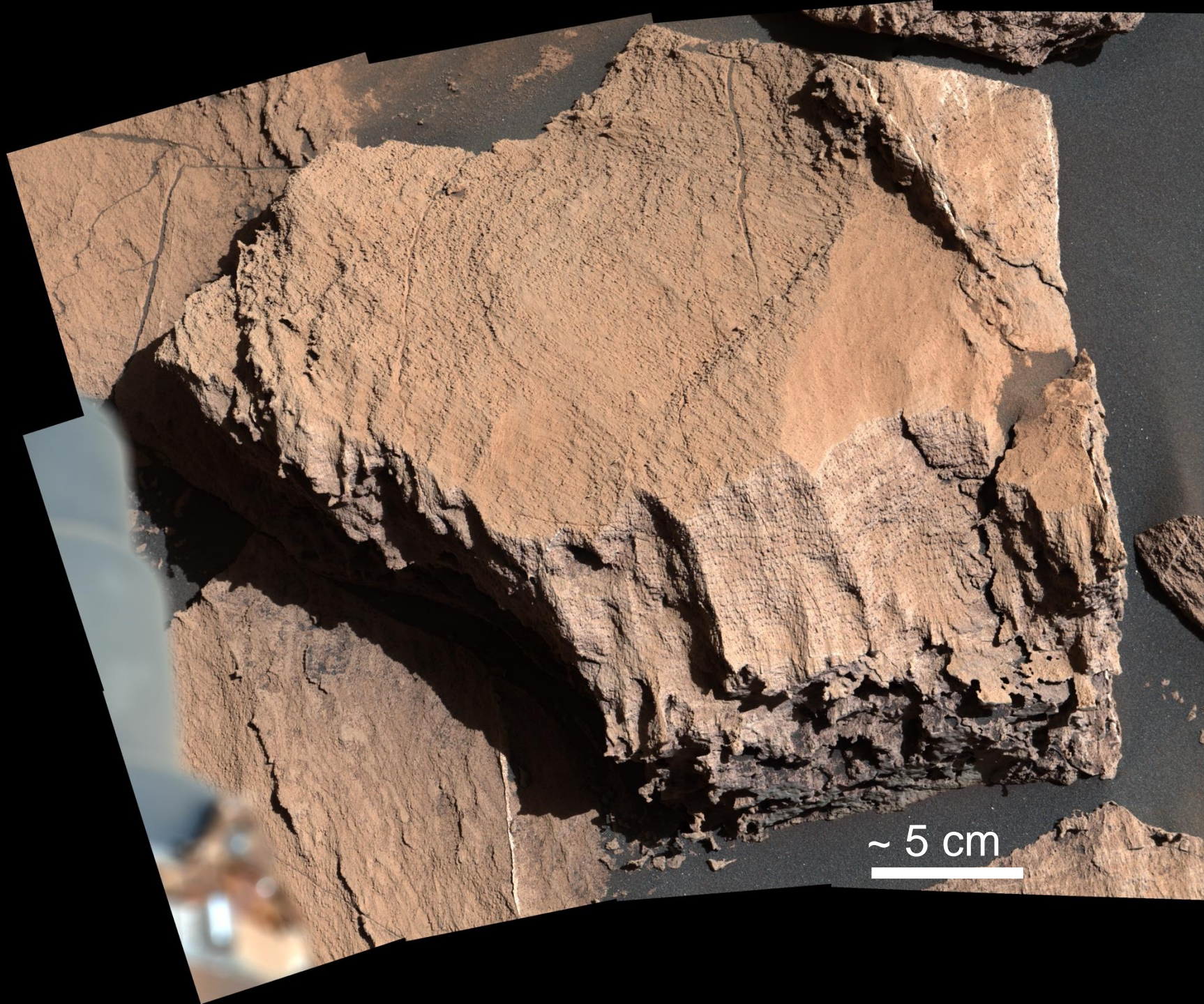
- Primary bedding often overprinted by textural features related to late stage water

Sol 3165

~ 25 cm



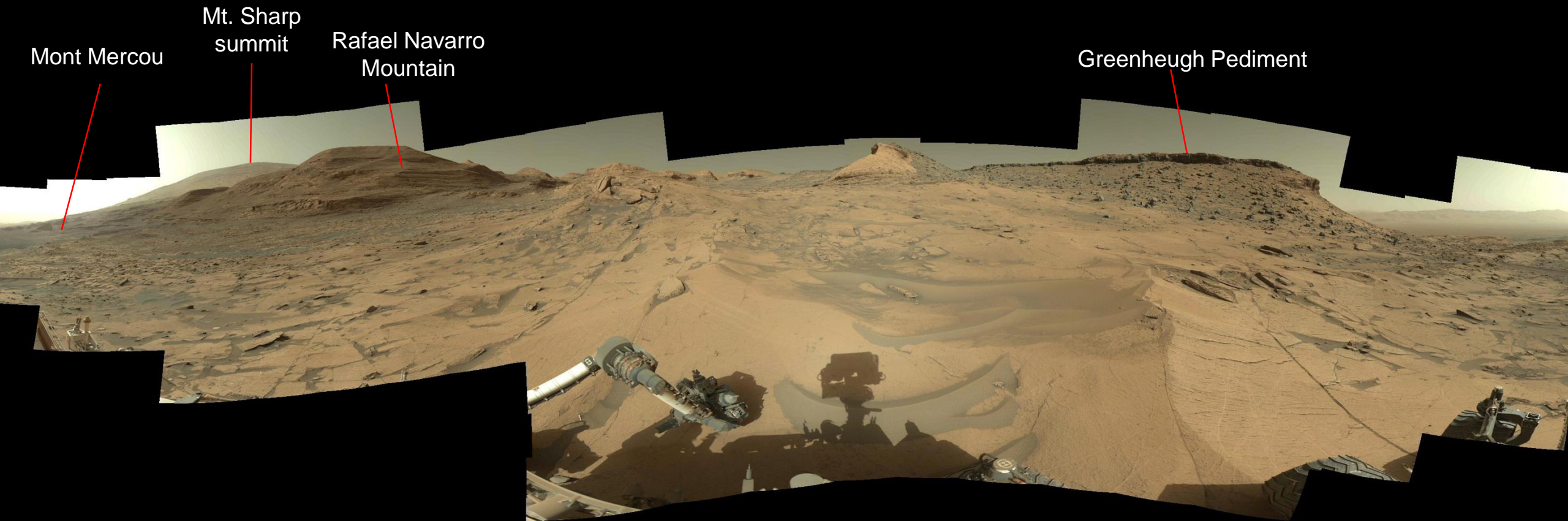
Sol 3212



Sol 3163 “Temptation Hill”



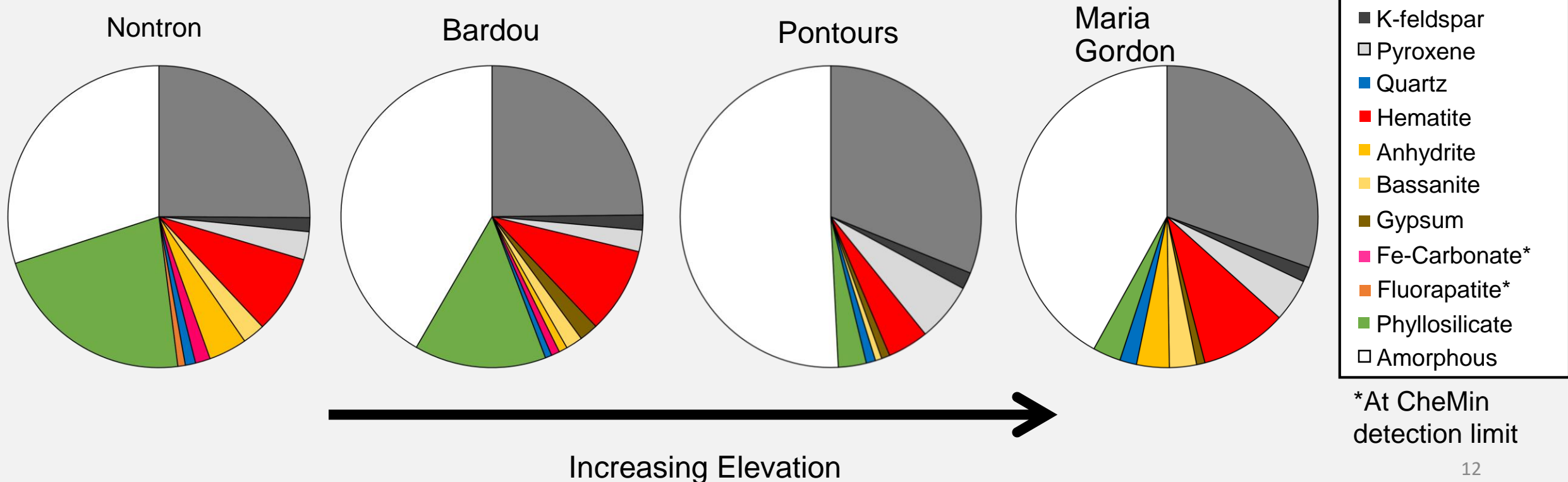
360° Mosaic from “Maria Gordon” Drill Location

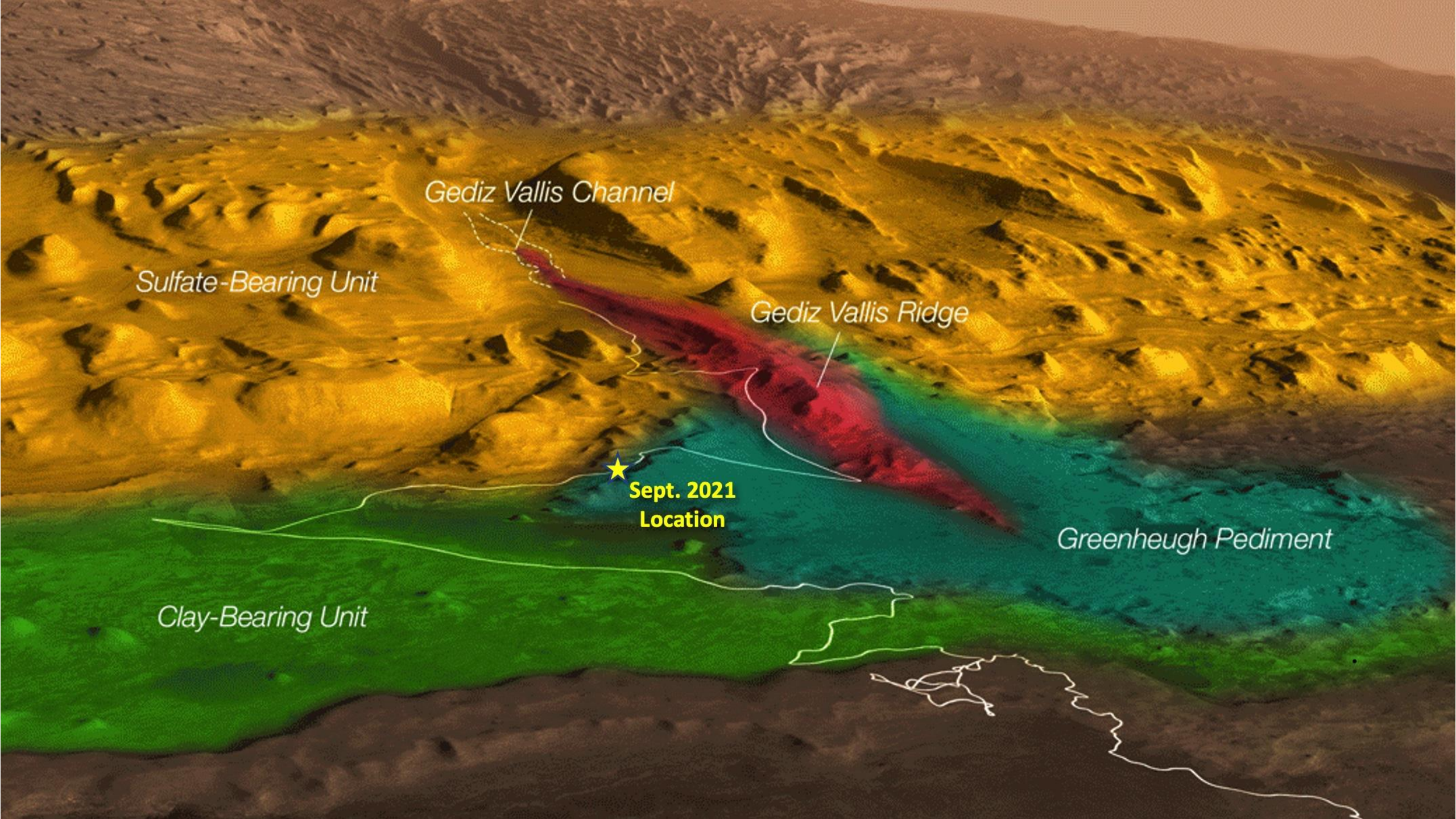


Composition

- Elemental composition of rocks remains relatively consistent, although ChemCam and APXS both detect localized areas with increased Na + Cl and Ca, Mg + S, consistent with the presence of salts
- Last two drill locations have very little clay minerals
- No detection yet of crystalline Mg sulfate

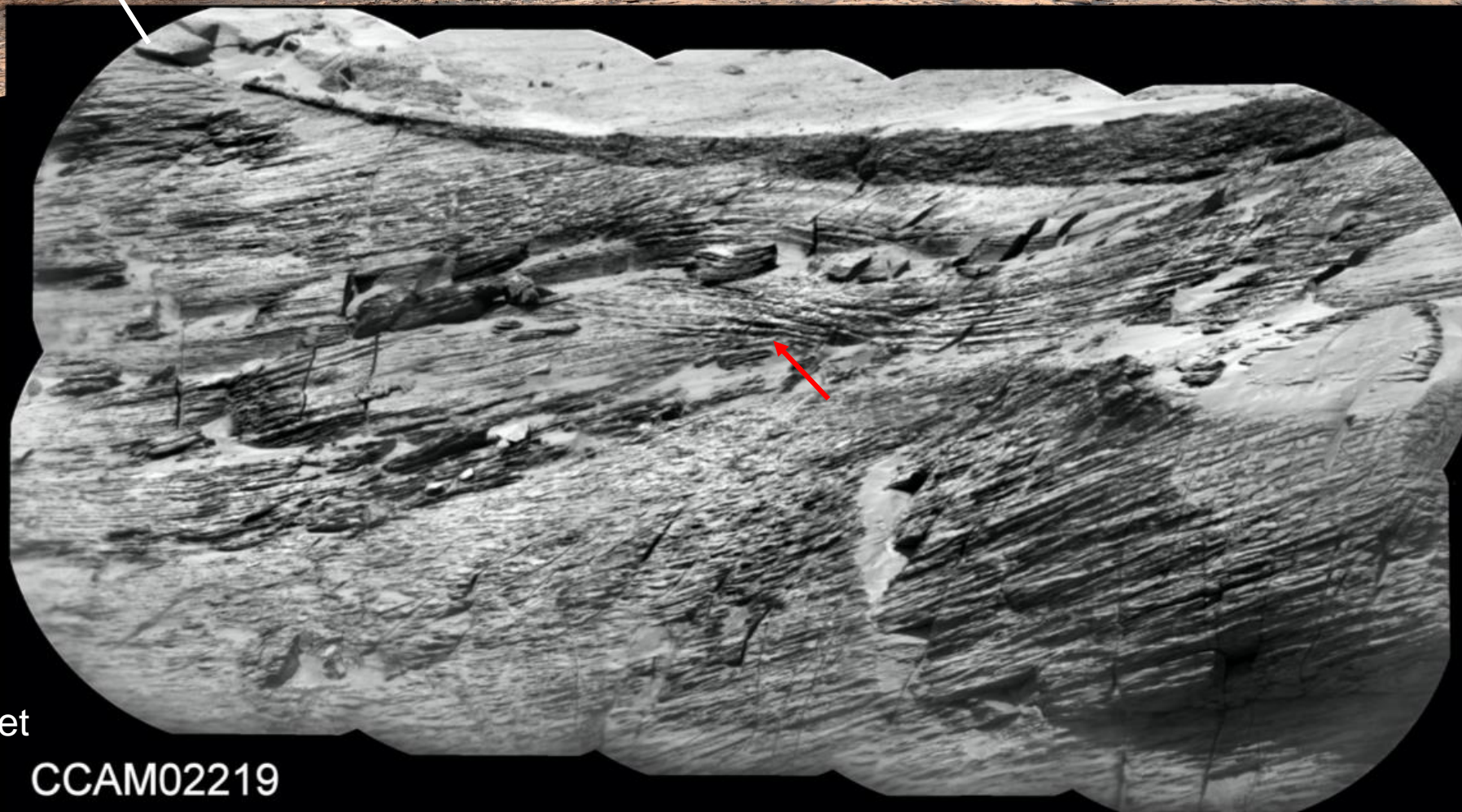
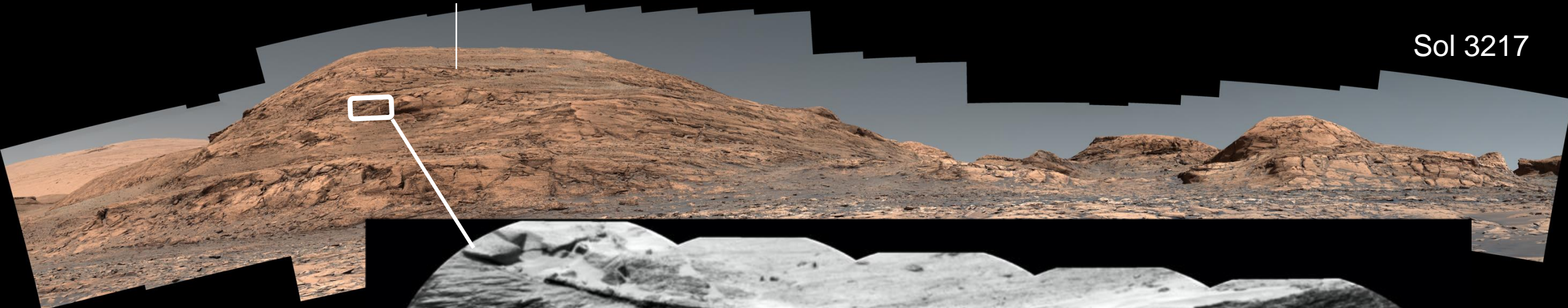
Drilled Sample Mineralogy from CheMin (Preliminary)





Rafael Navarro Mountain

Sol 3217



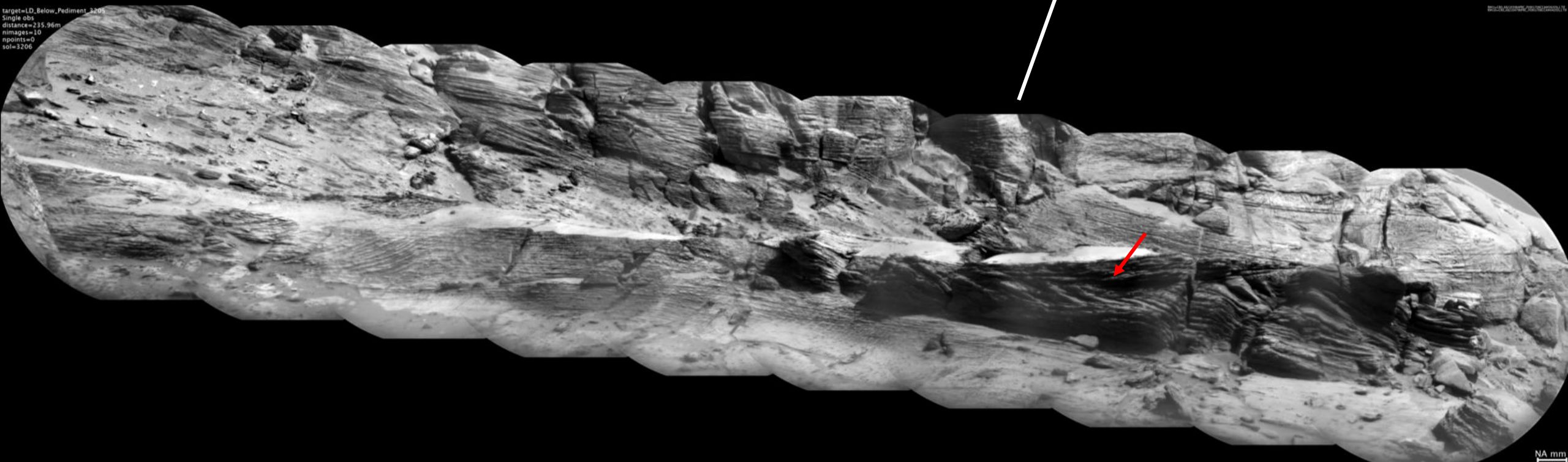
See also Fig. 2F in Rapin et
al., *Geology*, 2021

CCAM02219

Rafael Navarro Mountain

Sol 3217

target=LD_Below_Pediment_3205
Single obs
distance=235.96m
nimages=10
npoints=0
sol=3206



NA mm

New Views of the Greenheugh Pediment

Greenheugh pediment capping rocks

Sol 3202

“Siccar Point”



Unconformity
at Siccar Point
on Earth

- Much younger than Mt. Sharp group rocks, likely deposited in an arid aeolian environment

Summary

- The Curiosity science team is continuing to analyze data from the clay-sulfate transition region
- First analyses show region is characterized by decreasing clay abundance and unique diagenetic textures
- Large scale cross-bedding in overlying strata suggest change in depositional environment
- Upcoming traverse will include exploration of the Greenheugh pediment and Gediz Vallis ridge, furthering our understanding of changing environments and history of habitability in Gale crater

